EXAGGERATION OF THE PATELLAR TENDON REFLEXES IN ACUTE ANTERIOR POLIOMYELITIS.

By William G. Spiller, M.D.

It is taught that tendon reflexes in the affected limbs are lost in acute anterior poliomyelitis. This is usually the case, but occasionally exaggeration of these reflexes occurs. When the patellar tendon reflex is exaggerated, the wasting is chiefly in the leg below the knee, or in the leg of the opposite side. A case of poliomyelitis with exaggeration of the tendon reflexes was presented before this society by F. Savary Pearce some years ago. Another has recently been exhibited by C. E. Atwood before the New York Neurological Society (Journal of Nervous and Mental Disease, 1907, p. 600). Two cases are recorded by Minor (*Deutsche Zeitschrift für Nervenheilkunde,* vol. 30, p. 398). All of these were clinical cases, and no explanation is afforded by them for the exaggeration of the reflexes.

In *Brain,* 1903, Dr. Spiller published the report of a case of acute anterior poliomyelitis with necropsy, following variola. The degeneration of the lumbar region was typical of this disease, and was confined to the anterior horns. In preparations made by the Weigert hematoxylin method the anterior horns contrasted strongly by their pale coloration with the white columns. A photograph of one of the sections from the lumbar region appears in the article mentioned. Implication of the lateral columns occurred in a limited area in the thoracic region. This case offers an explanation for the exaggeration of reflexes seen in certain cases of acute poliomyelitis. If the degeneration of the lower part of the cord does not implicate the cells innervating the thigh muscles, but is confined to those supplying the muscles of the leg below the knee, as is so often the case; and if the lateral column of one or both sides is implicated in the thoracic region, exaggeration of the patellar tendon reflex may occur. Poliomyelitis is not a process absolutely confined to the gray matter of the cord.

The following two cases are examples of acute anterior poliomyelitis with exaggeration of the patellar tendon reflex.

Case 1. R. G. J. Aged 29 years, male, white, was examined February 27, 1904. He had anterior poliomyelitis when about fourteen months old, and since that time the right lower limb, especially below the knee, was not developed properly. The right thigh is not much smaller than the left. Sensation in the right lower limb has not been impaired.

The right lower limb is much smaller than the left lower limb in all parts below the knee, where there is scarcely any muscular development. The right foot is in the position of marked talipes equinus, but the deformity can easily be overcome by passive movement. The man can flex and move the right toes inward, but has no power of extension of the toes. All movement of the right ankle is lost. The Achilles jerk is lost on the right side and is prompter than normal on the left side, but the patellar reflex is much exaggerated on the right side, and is also somewhat exaggerated on the left side.

The upper limbs appear to be normal.

Case 2. B. Colored, aged 14, male, came to the dispensary of the University Hospital, February 23, 1907. Three years previously he had some disease with fever and became paralyzed in the right upper and lower limbs simultaneously. He recovered the use of the right upper limb, so that the grasp of the right hand is as good as that of the left, and the biceps tendon reflex is about the same on both sides, but not very prompt. The whole right upper limb is distinctly smaller than the left. The atrophy in the right lower limb below the knee is pronounced. The right foot is everted and contractured so that the patient walks on the inner side of the foot. He has steppage gait on the right side from foot-drop. The patellar reflex is exaggerated on the right side and about normal on the left side. Sensations of touch and pain are normal in the right lower limb. The electrical examination was made by Dr. C. S. Potts. In the right leg feeble faradic response is obtained in the soleus, gastrocnemius, flexor longus pollicis, flexor longus digitorum, and extensor longus digitorum muscles. The faradic response is lost in the tibialis anticus, extensor proprius pollicus and peronei. Galvanic reaction could not carefully be determined because of the patient's resistance, but there was evidently diminished galvanic contractility in the muscles of the distribution of the peroneal and internal popliteal nerves. The other muscles responded normally.

Dr. J. P. Crozier Griffith first of all had a few words to say about the etiology of poliomyelitis. The epidemic under consideration, like other epidemics, teaches us that the disease must be an infectious one. Nothing so much convinces us as personal experience, and the observation a number of years ago of the simultaneous development of the disease in two sisters led him at that time to accept readily the disease as infectious. He thought the whole symptom-complex indicated that it was an infectious disorder. He would mention in passing that he had the opportunity of seeing a few years ago a little child in the sixth day of the disease, who at the same time was suffering from pneumonia. Of course that is no proof of anything; it is merely suggestive. We know that all infectious diseases have a certain tendency to be accompanied by pneumonia, and that one may sometimes find in the lungs the specific germ of the primary disease, associated or not with the pneumococcus.

The matter of the method of infection in poliomyelitis is not at all understood. Dr. Griffith said he noticed that Harbitz and Scheel agree with the gentlemen who have already spoken that entrance is very likely by way of the intestinal tract. Though we have a germ reported by von Geirsvold this has not been corroborated, and the discoverer himself is not very certain that it was after all the cause of the affection. The matter is still *sub judice.*

Next, about the matter of mortality. Until the epidemics from Norway and Sweden were reported he had not realized that the death rate was as great as it is, varying from 10 per cent. to much more than that, one Norwegian observer placing it at 19 per cent. in the cases reported by him. We have been prone to view it as not immediately dangerous.

Last of all, about the clinical manifestations and the lesions. He has had occasion to observe one very interesting instance of involvement of the abdominal muscles, but the case which interested him most was one with involvement of the muscles of the face, originally combined with that of the muscles of the extremities, although recovery had been apparently complete in these latter. The case represented a combination of poliomyelitis with encephalitis. When Strümpell, many years ago, brought into prominence the occurrence of polioencephalitis considerable skepticism obtained regarding it. Now we no longer dispute its existence and acknowledge that it can be associated with poliomyelitis.

It is a mistake to view poliomyelitis as merely an atrophy of the anterior horns; it is more than that. Like other infectious diseases it spreads by way of the blood vessels. It is not simply in the horns alone, it is widespread, at first involving many parts of the cord and the large brain as well, and then, as a rule, disappearing from every place but the one region, but in some instances persisting in the brain also. This is another proof that we are dealing primarily with a blood infection.

Dr. McCombs gave statistics from the Children's Hospital of Philadelphia. His investigations embraced four and a quarter years, from July, 1903, to November, 1907. In 1903 (six months only) there were 6 cases; in 1904, 7 cases; in 1905, 6 cases; in 1906, 4 cases; in 1907, 26 cases. From July 23 to October 24, 1907, there were 24 cases. In addition there were during the last period 6 cases which applied for admission but were not admitted into this hospital. They were not, therefore, included in the following tables. Cases of less than one month's duration on admission: July, 1903, to July, 1907 (four years), 12 cases; July, 1907, to October, 1907 (three months), 18 cases.

Total cases treated: July, 1903, to July, 1907 (four years), 25 cases; July, 1907, to October, 1907 (three months), 24 cases.

The cases were carefully selected, all those that were doubtful being excluded. On comparing eighteen cases of less than a month's duration on admission with twenty-five cases in which the histories were complete enough to make valuable records, it was found that the cases occurring during the epidemic did not deviate from those occurring before. The discovery of paralysis as the first symptom was slightly in excess of an onset with initial fever and vomiting, which were most prominent in the twenty-five cases. The paralysis appeared most often during the first twenty-four hours, as in the twenty-five cases; and likewise involvement of a single extremity was the most frequent form of paralysis, closely followed by failure of both legs. Pain was noted in about the same proportion (one fourth) of the cases. Meningeal symptoms were lacking, and improvement seemed about the same as in the previous twenty-five cases.

Dr. Fox stated that the Department of Health received word in the early fall that poliomyelitis was prevalent in Butler, Venango and Elk counties. The Commissioner of Health asked him to go there to make bacteriological examination of the disease, to find some cause, bacterial or parasitic, for this disease, and to make some effort to trace the course of the infection. The facts of hygiene and the epidemology Dr. Free had given better than he could give at the present time, and the work on cerebro-spinal fluids, nose and throat cultures from animals, particularly chickens, and a few bed bugs, are not as yet completed. Dr. Fox said he feared they would be in vain. Everything seems to point in that direction. The work is being carried on at the laboratory of the Department of Health, and it is hoped that a publication will be made shortly, but not too shortly to be able to say something definitely. At present there is nothing in the research from the etiological standpoint, from the hygienic standpoint, from the bacteriological standpoint which would point to the cause, transmission and course of the disease.

Dr. W. B. Cadwalader said he would like to speak of a case he had the opportunity of examining which was under the care of Dr. Eshner at the Orthopedic Hospital during August of this past summer. The history which he could only speak of from memory at the present time was that the child originally developed pain in the leg, and on the second or third day following he had paraplegia, and later on the fourth or fifth day when he was admitted to the hospital he developed some weakness of both arms, some stiffness of the neck muscles, was very drowsy, had rapid respiration, and finally the sixth day he died suddenly with what appeared to be acute bulbar symptoms. At the time there was some question whether it was a case of epidemic cerebro-spinal meningitis. The necropsy was performed by Dr. Hill, the resident, and the abdominal and thoracic organs were found to be negative, except for some congestion of the lungs; the cord and brain were preserved and Dr. Cadwalader had examined it. So far he has examined only the cord. The gross appearance of the cord was not very definite. There were a few areas of ecchymoses about some of the vessels of the anterior surface of the cord which seemed to extend practically the whole length to the pons, and on cross section there was in the lumbar and sacral cord, particularly, a very definite hemorrhagic area in the gray matter on both sides; the left side, perhaps, more than the right, and this extended in varying degrees all the way to the pons through the cord and medulla oblongata, but was more marked in both the cervical and lumbar regions. The dura was possibly a little discolored about the cervical region. Dr. Hill told him that when the cord was in the fresh state there was a definite hemorrhage in the dura at that point, but after a time when the tissue was in formalin it was difficult to make it out. In the stained sections of the cord, the central canal appeared normal, excepting in one or two sections, the cells lining the canal in some places appearing to be torn off. The dura was normal throughout the length of the cord microscopically, but the pia appeared to be separated and was infiltrated by round cells with a deep staining nucleus, some of them definitely polymorphonuclear leucocytes. The gray matter was very markedly affected in the cervical, thoracic and lumbar swellings, and there was an intense round cell infiltration about the vessels. This was most marked perhaps in the posterior part of the anterior horns about the columns of Clarke. The vessels were dilated and the whole picture was intense in the lumbar and cervical regions. The white matter was affected but not to such great extent as the gray. In a number of sections in the dorsal region the septa running through the white matter of the cord suggest the possibility of their carrying the round cells from the pia into the substance of the cord. That he did not feel at all certain about, but it possibly may be so. Dr. Cadwalader said he had not studied the sections carefully enough to be able to give information on this theory.

Dr. J. W. McConnell said in regard to polio-encephalitis and poliomyelitis, it was his fortune or misfortune to fall in with this epidemic in Corsica in this state. He was called to see a child who died a few hours before he got there, having been sick five days. It was first paralyzed in the upper extremities, secondly in the lower, and the day before death was unable to swallow and died apparently of respiration paralysis. The general history was that of acute poliomyelitis. A second case was seen in Philadelphia, similar in every respect to the advance of the disease, and as to the difficulty in swallowing, and as to death from paralysis of respiration. Another feature in the first case was that the patient was taken sick two weeks after the death of a child from the same disease in the family of the milkman supplying them with milk. It seemed significant in that particular connection. Furthermore, one of the points that struck Dr. McConnell in the study of the cases in Dubois and Corsica was the very marked, almost absolute constipation, that all these children showed, and vomiting and fever were present in all these cases.

Dr. Weisenburg thought that the participation of the lower animals such as pigs and chickens in the disease is very suggestive. In only one other disease that he recalled was the infection carried by means of the soil. This was in the disease known as beri-beri which is prevalent in tropical countries. He told of an instance in which patients who were quartered on one side of a military prison had the disease, while those on the other side were free from it. An exchange was made of these prisoners only to have the healthy prisoners infected with the disease when they were removed to the other side. In beri-beri it is supposed that the infection is carried by means of the soil.

Dr. Alfred R. Allen said his attention was called to the rarity of this affection in the colored race by Dr. S. Weir Mitchell some years ago. He himself had never seen the disease in a colored person.

Dr. Gordon said he wished to say in reference to Dr. Spiller's statement relating to exaggerated reflexes that he examined a child for Dr. H. A. Wilson in whom there was a typical onset of the acute infantile paralysis, fever, vomiting and diarrhea, paralysis of the lower extremities. The child was brought ten days after the onset of the disease. The patellar reflexes were markedly exaggerated, curiously enough the arms also presented the exaggerated reflexes, still the flaccidity of the paralysis and the onset of the disease spoke in favor of anterior poliomyelitis. Dr. Gordon thinks there are two great points which should be studied and which are extremely important: First, the question of the bacteriological basis; second, the manner of involvement of the anterior cornua. It is conceded that in a number of cases the pneumococcus and the meningococcus were found, and still in a number of other cases of the same form and same severity no microörganism was found. The bacteriology of the disease is entirely incomplete and absolutely uncertain. The experimental observations are also negative.

In regard to the transmission of the disease whatever the cause may be, whether it is a microorganism or a toxin, it is not at all certain that the blood stream is the carrier of the poison. In Landry's paralysis or rabies in which the lesions are almost analogous to the lesions of the anterior poliomyelitis, it is almost certain that the poison does not follow the blood stream. These two points: What is the real cause of the disease, and how the infection reaches the anterior cornua are the two great problems to be studied.

In regard to the epidemicity of the disease: In the Jefferson Hospital since July there were 21 cases, 7 of these 21 cases came from a single locality of the city. They did not occur about the same time, but pretty nearly about three or four weeks apart. Every year about the same time a certain rush of these cases comes to the Jefferson Hospital.

As far as negro cases are concerned: Dr. Gordon has seen two cases at the Douglass Memorial Hospital.

Dr. Free, in closing, said only one case had paralysis on the first day. He said that doctors, including himself, were wrong in giving the affection the name of poliomyelitis. The necropsies could not be obtained. A great effort to do so was made in all four of the fatal cases. In addition to the case in which lumbar puncture was performed before death, he wished to state that a lumbar puncture was done two hours after death in another case. In neither of these cases were meningococci found.

Dr. C. S. Potts said he could not add anything new in regard to the treatment. He has seen very few cases in the acute stage. In the chronic the patients are treated by massage, electricity, exercises, and when indicated, by either the use of braces, nerve anastomosis or tendon transplantation. Nerve anastomosis may possibly be of some service in the case Dr. Potts exhibited. Treatment is usually symptomatic in the acute stage, with cold to the spine, mild counter-irritation and of course absolute rest in bed.

Dr. McCombs stated that Dr. Ludwig obtained some wonderful results from the Bier-Clapp method.

Dr. Gordon thought it significant that the child exhibited by Dr. Free which showed the most complete recovery, had been given antitoxin injections.

A CASE OF OLD POLIOMYELITIS (ACUTE) FOLLOWED BY MUSCULAR ATROPHY IN FACE AND HANDS.

By S. D. Ingham, M.D.

C. L. Age 42 years. Rug weaver. Born in Denmark.

Family History.—Both parents lived to be old. Patient knows of no similar disease among his relatives.

Does not remember ever having had any serious illness. Uses alcohol and tobacco moderately, but regularly. No venereal history. When eight or ten years old both hands were burnt by molten tin (principally on dorsal aspect). He states that the left leg has always been crippled, that "he was born that way," but examination shows that the condition was probably an acute poliomyelitis in infancy, the left leg from the knee down being shorter than the right and much smaller. The left foot is in cavus position, the only voluntary power in the leg being dorsal flexion of ankle and slight extension of toes. (Peroneal and anterior tibial muscles intact.)

Right Leg is normal as to power, development, reflexes, etc. The *face* shows muscular atrophy and weakness, as in attempts to show teeth, smile or whistle. He cannot close the eyes, attempts to do so leaving palpebral fissures nearly one fourth inch wide, in which condition they remain during sleep. Tongue and palate negative. Pupils and extraocular movements normal.

Hands, both right and left show atrophy of the intrinsic muscles. Thenar and hypothenar eminences are almost entirely absent. Grip is fair. No atrophy is present in forearm or arm.

Reflexes.—Biceps jerks and triceps jerks are present.

No atrophy is found in any other part of the body. No fibrillary tremors occur anywhere.

Electrical Reaction present in all muscles showing voluntary power to both faradic and galvanic currents. No R.D. is obtained.

The patient does not know when the condition in the face and hands developed. Inability to close eyelids developed about ten years ago during examination by ophthalmologist. He has noticed no progress in the condition, except slight weakness in voice (articulation) and occasional slight choking attacks, especially when swallowing liquids.

In discussing Dr. Ingham's patient, Dr. W. G. Spiller said that the case appeared to be one of muscular dystrophy developing after a long-standing anterior poliomyelitis. The patient was 32 years old when he first noticed the weakness of the orbicularis palpebrarum muscles, but there may have been some defect previously undetected. He has more